

Mar 16-12:20 PM

I. Parts of a Circle

A. Circle: the set of all points equidistant from a given point called the center.
*Name a circle by its center point.

B. Chord: segment with endpoints on the circle.

C. Secant: a line that intersects the circle at two points.

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D. Tangent: a coplanar line that intersects a circle at one point.

E. Point of tangency: where the tangent intersect the circle.

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VI. Circles and Arcs

A. Circle: set of all points equidistant from a given point called the center.

1. radius: segment with an endpoint on the circle and an endpoint at the center.
2. diameter: segment with endpoints on the circle and containing the center.
3. congruent circles: circle with congruent radii but different centers
4. concentric circles: circles with same center but different radii.

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- 1) radius _____
- 2) diameter _____
- 3) chord _____
- 4) secant _____
- 5) tangent _____

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B. Circumference: distance around a circle
 $C = \pi d$

C. Area: number of square units the circle encompasses
 $A = \pi r^2$

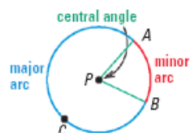
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III. Arcs and Chords

A. Central Angle: angle whose vertex is the center of the circle.

B. Arc: part of a circle

1. Minor arc: measures less than 180
2. Major arc: measures greater than 180
3. Semicircle: end points of arc are the endpoints of the diameter.

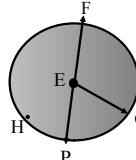


The measure of an arc is equal to the measure of the central angle.

major arc $> 180^\circ$ 3 letters

minor arc $< 180^\circ$ 2 letters

semicircle $= 180^\circ$ 3 letters



minor arc=
major arc=
semicircle=

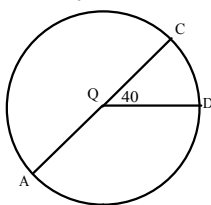
$m\angle FEG = 100^\circ$ $m\widehat{FG} =$

$m\widehat{FHG} =$

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In $\odot Q$, find $m\widehat{CD}$, $m\widehat{CAD}$, $m\widehat{AD}$, $m\widehat{DCA}$.

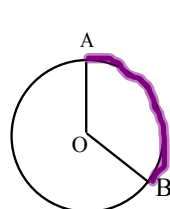


Arcs are measured in degrees

Arc length is a measure of distance around part of the circle

Arc Length = fractional part of the circumference

$$AL = \frac{\text{central angle}}{360^\circ} \times \pi d$$



length of $\widehat{AB} = ?$

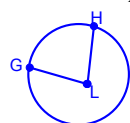
$OB = 9$ in
 $m\angle AOB = 120$

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H. Area of a sector

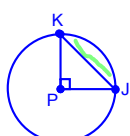
1. Sector: region bound by an arc of the circle and 2 radii with the arc's endpoints
2. Area of a sector is a fraction of the area of the circle.



$$A \text{ of sector} = \frac{\text{central angle}}{360^\circ} \times \pi r^2$$

$m\widehat{GH} = 80^\circ$; $LH = 6$ m

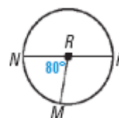
area of sector GLH



Area of the shaded if:
 $PJ = 8$ cm

9.3

Find the measure of each arc of $\odot R$.



D. In a circle or \cong circles:

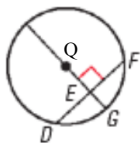
- 1) \cong central $<$ have \cong chords
- 2) \cong chords have \cong arcs
- 3) \cong arcs have \cong central $<$

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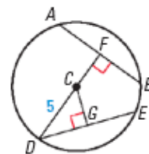
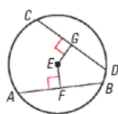
In a circle, the diameter is perpendicular to the chord if and only if it bisects the chord and its arc.

Since QG is perpendicular to DF then:



In a circle or \cong circles, chords are \cong if and only if they are equidistant from the center.

If $EF = EG$ then $CD = AB$

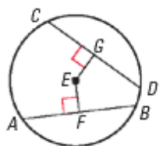


$AB = 8$, $DE = 8$, and $CD = 5$. Find CF .

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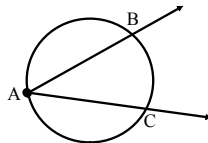
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If $\overline{AB} \cong \overline{CD}$, $AB = 40$, $ED = 25$
Find EF



V. Inscribed Angles

- A. Inscribed angle: an angle whose vertex is on the circle and whose sides contain chords of the circle.
- B. Intercepted arc: the arc that lies on the interior of the angle with endpoints on the angle.

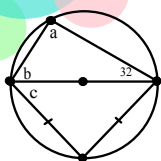
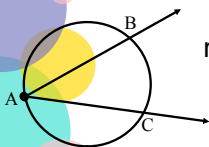


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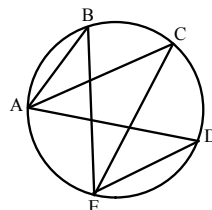
C. The measure of an inscribed angle = $\frac{1}{2}$ the measure of its intercepted arc.

$$m\angle BAC = \frac{1}{2} m\widehat{BC}$$



D. Two inscribed angles intercept the same arc, then the angles are congruent.

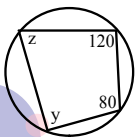
List all the congruent angles



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- E. A quadrilateral can be inscribed in a circle iff the opposite angles are supplementary



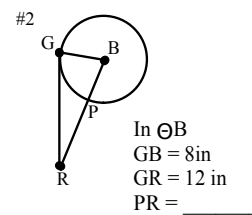
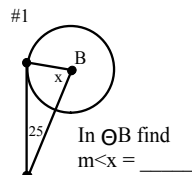
$$Z = \underline{\hspace{2cm}}$$

$$Y = \underline{\hspace{2cm}}$$

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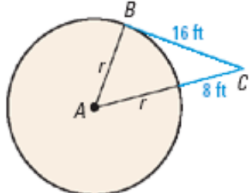
II. Tangents

- A. If a line is tangent to a circle, then the line is perpendicular to the radius at the point of tangency.
(*Converse is also true.)

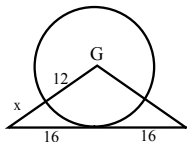


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- #3 What is the value of r ?

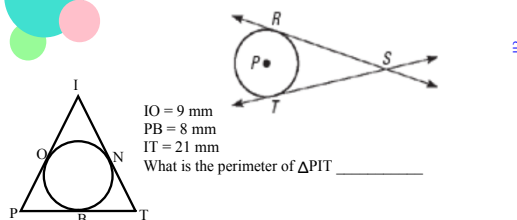


- #4 What is the value of x ?



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- B. Two segments tangent to the same circle from the same exterior point are congruent.

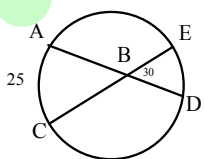


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VI. Angle Relationships in Circles

- A. Central angle = intercepted arc
B. Inscribed angle = $\frac{1}{2}$ (intercepted arc)

- C. Two chords intersect in the interior of the circle, then the angle formed = $\frac{1}{2}$ the sum of the intercepted arc.



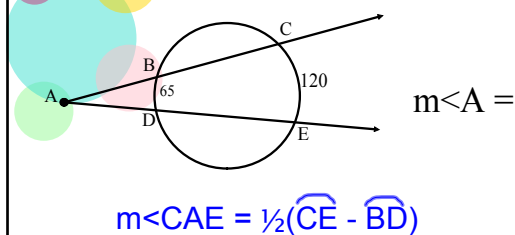
$$\angle ABC \cong \angle EBD \quad (\text{vertical angles } \cong)$$

$$m\angle ABC = \frac{1}{2} (\widehat{AC} + \widehat{ED})$$

$$m\widehat{ED} = \underline{\hspace{2cm}}$$

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- D. If two secants intersect in the exterior of the circle, then the measure of the angle = $\frac{1}{2}$ the difference of the intercepted arc.



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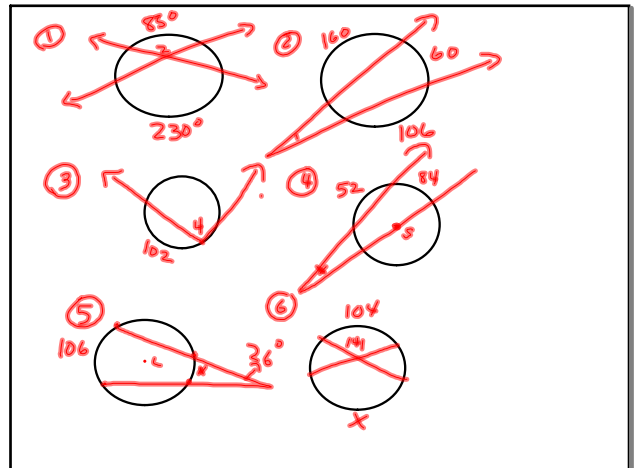
Review:

If the vertex of the angle is

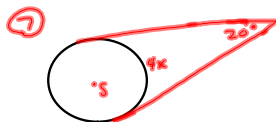
1. at the center = arc
2. on the circle = $\frac{1}{2}$ arc
3. in the interior = $\frac{1}{2}$ (arc + arc)
4. in the exterior = $\frac{1}{2}$ (arc - arc)



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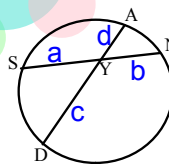


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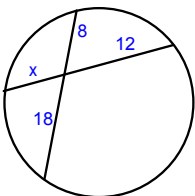
IV. Segments in Circles

A. If two chords intersect in the circle, then the product of the segments of one chord = to the product of the segments of the other chord.

INSIDE CIRCLE
 $ab = cd$



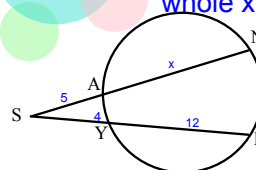
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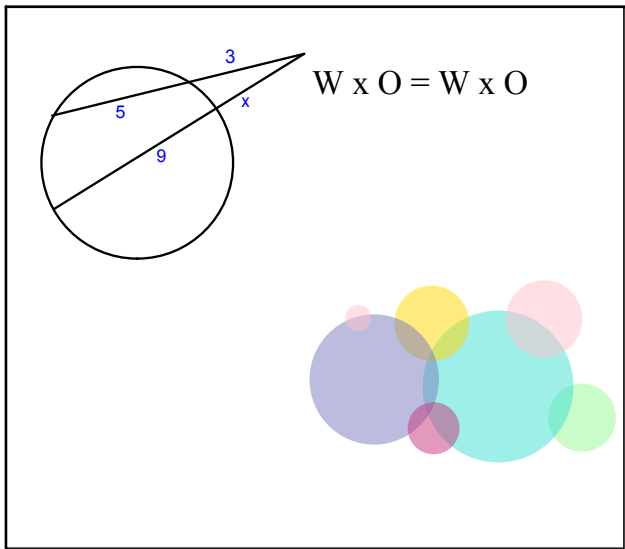
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B. If two secants intersect outside the circle, the product of the whole secant and the outside segment = the product of the whole secant and the outside segment.

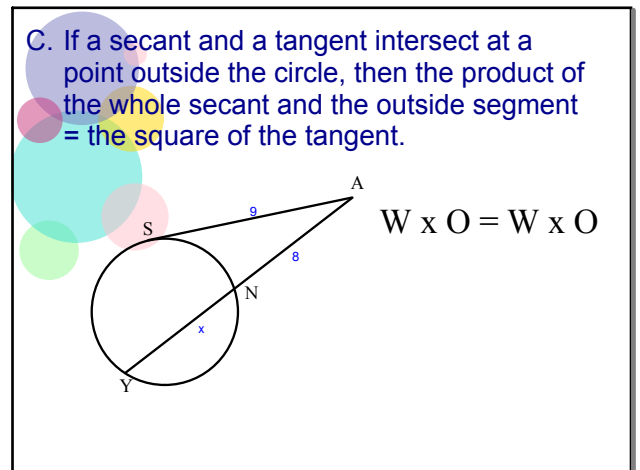
OUTSIDE CIRCLE
whole x outside = whole x outside



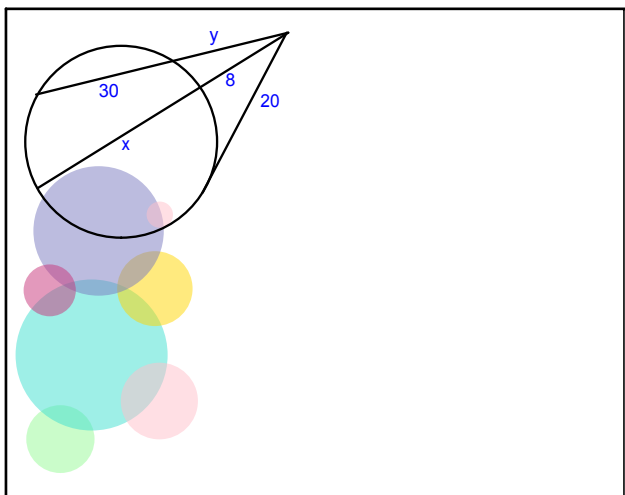
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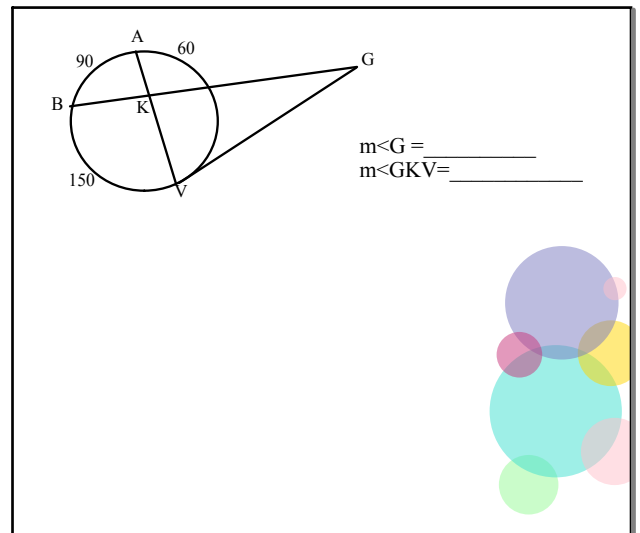
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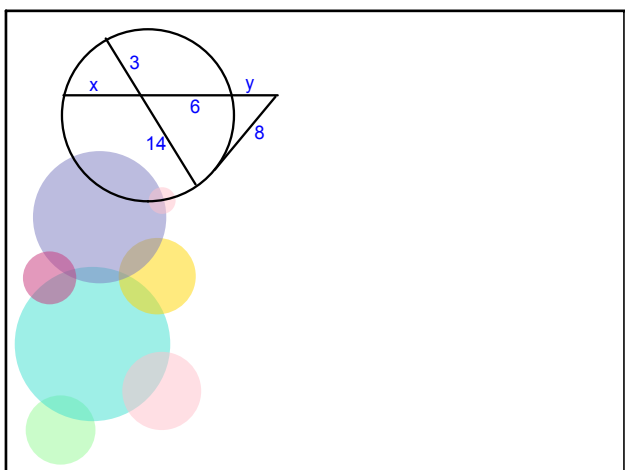
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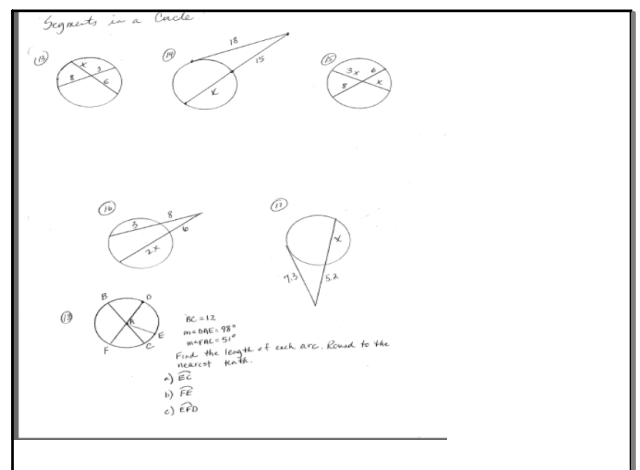
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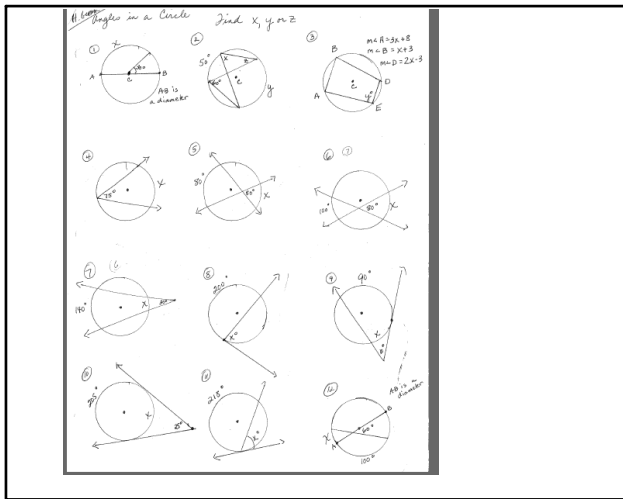
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VI. Equation of Circles

A. Center of a circle (h, k)

B. Radius of a circle r

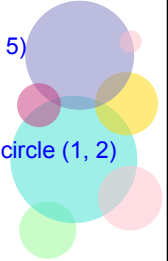
C. Standard equation of a circle

$$(x - h)^2 + (y - k)^2 = r^2$$

Ex Write an equation of the circle

1. radius = 7 and the center is $(-3, 5)$

2. center $(0, 5)$ and a point on the circle $(1, 2)$



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The endpoints of the diameter is $(-3, 8)$ and $(5, 6)$, what is the equation of the circle?



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